

## WHAT IS CLAIMED IS:

1. A system (200) comprising:

one or more processors (204) configured to detect perimeter edges (306) of one or more rotor blades (234) of a turbine assembly (230) as depicted in a series (300) of image frames (302) using boundary analysis performed on the image frames,

wherein the one or more processors are configured to identify a set (400) of the image frames as key frames (402) based on positional offsets (354) between the perimeter edges that are detected in the image frames and a reference blade pose (350) such that the key frames are able to be inspected for objects-of-interest without inspecting the image frames that are not the key frames.

2. The system (200) of claim 1, wherein the one or more processors (204) are configured to perform the boundary analysis by individually examining the image frames (302) one at a time as input images (106) in a forward propagation direction through layers (314) of artificial neurons in an artificial neural network (304).

3. The system (200) of claim 1, wherein the one or more processors (204) are configured to inspect the key frames (402) for objects-of-interest by individually examining each of the key frames one at a time as input images (106) in a forward propagation direction through layers (406) of artificial neurons in an artificial neural network (404).

4. The system (200) of claim 1, wherein the one or more processors (204) are further configured to apply a mask image (502) on the key frames (402) to define an exposed region (504) on the key frames that is not concealed by the mask image, wherein the one or more processors are further configured to inspect the exposed regions of the key frames to detect objects-of-interest within the exposed regions without inspecting regions of the key frames outside of the exposed regions and without inspecting the image frames (302) that are not the key frames.

5. The system (200) of claim 1, wherein the one or more processors (204) are further configured to superimpose a mask image (502) on the key frames (402)

based on the perimeter edges (306) that are detected in the image frames (302) identified as the key frames, the mask image defining an exposed region (504) on each of the key frames that is not concealed by the mask image, the exposed region representing a surface area of a primary rotor blade (506) of the one or more rotor blades (234) in the corresponding key frame.

6. The system (200) of claim 5, wherein the one or more processors (204) are further configured to compare a template blade image (604) to the perimeter edges (306) of the one or more rotor blades (234) in each of the key frames (402), the template blade image depicting a sample rotor blade (606), the one or more processors also configured to deform a template mask image (602) associated with the template blade image to generate the mask image (502) that is superimposed on the key frames based on the comparison between the template blade image and the perimeter edges.

7. The system (200) of claim 1, wherein the one or more processors (204) are configured to identify a corresponding image frame (302) in the series (300) as one of the key frames (402) in response to the positional offset (354) between the perimeter edges (306) that are detected in the corresponding image frame and the reference blade pose (350) being less than a designated threshold value.

8. The system (200) of claim 1, wherein the one or more processors (204) are configured to identify a corresponding image frame (302) in the series (300) as one of the key frames (402) in response to the positional offset (354) in the corresponding image frame being less than the respective positional offsets in each of the image frames acquired immediately before and after the corresponding image frame in the series.

9. The system (200) of claim 1, wherein the objects-of-interest include one or more of spalling or cracks in the rotor blades (234), and, responsive to detecting one or more of the objects-of-interest, the one or more processors (204) are configured to one or more of automatically schedule maintenance for the turbine assembly (230), automatically alert an operator, automatically generate an inspection report, or automatically stop rotation of the turbine assembly.

10. The system (200) of claim 1, wherein each of the image frames (302) depicts a plurality of the rotor blades (234) of the turbine assembly (230) while the turbine assembly rotates, and each of the key frames (402) depicts a primary rotor blade (506) of the respective plurality of rotor blades in a centralized position within the key frame, the one or more processors (204) further configured to mask regions of the key frames outside of the respective primary rotor blades.

11. A method (700) comprising:

obtaining a series (300) of image frames (302) depicting multiple rotor blades (234) of a turbine assembly (230) while the turbine assembly rotates, each of the image frames depicting one or more of the rotor blades;

detecting perimeter edges (306) of the one or more rotor blades depicted in each of the image frames using boundary analysis performed on the image frames by one or more processors (204);

identifying, via the one or more processors, a set (400) of the image frames as key frames (402) based on positional offsets (354) between the perimeter edges that are detected in the image frames and a reference blade pose (350); and

inspecting the key frames for objects-of-interest without inspecting the image frames that are not in the set of the key frames.

12. The method (700) of claim 11, wherein a corresponding image frame (302) in the series (300) is identified as one of the key frames (402) in response to the positional offset (354) between the perimeter edges (306) that are detected in the corresponding image frame and the reference blade pose (350) being less than a designated threshold value.

13. The method (700) of claim 11, wherein a corresponding image frame (302) in the series (300) is identified as one of the key frames (402) in response to the positional offset (354) in the corresponding image frame being less than the respective positional offsets in each of the image frames acquired immediately before and after the corresponding image frame in the series.

14. The method (700) of claim 11, wherein each of the key frames (402) depicts a different one of the rotor blades (234) of the turbine assembly (230) disposed in alignment with the reference blade pose (350).

15. The method (700) of claim 11, wherein the detecting of the perimeter edges (306) of the one or more rotor blades (234) comprises individually examining the image frames (302) one at a time as input images (106) in a forward propagation direction through layers (314) of artificial neurons in an artificial neural network (304).